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(54) Strips for the production of solderable metal covers for housings of ceramic material

(57) A strip (Fig. 1) for the production of solderable metal covers (Fig. 5) for sealing housings of ceramic material which contain a semi-conductor or an

integrated circuit is less than 0.5 mm thick, and consists of a metal carrier 4 which has a thermal co-efficient of expansion similar to that of the housing material and is provided with a solder layer 1 having spaced recesses 2 or cut-outs arranged at a distance from each other.

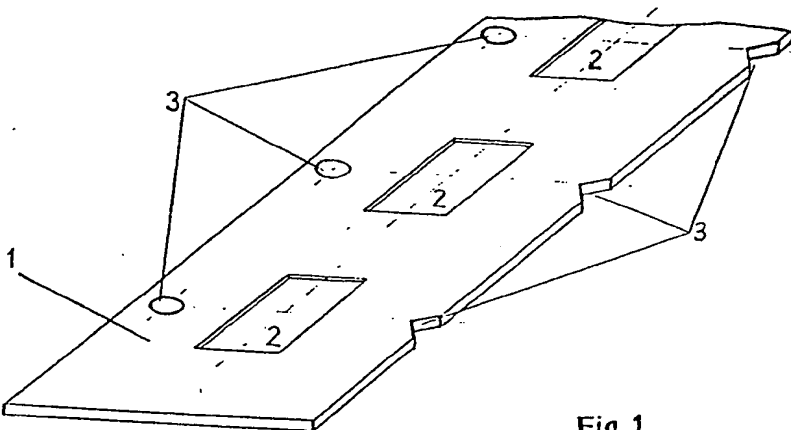


Fig. 1

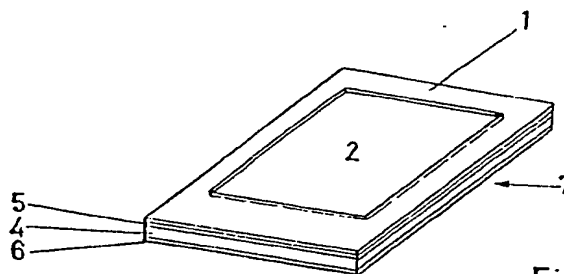


Fig. 5

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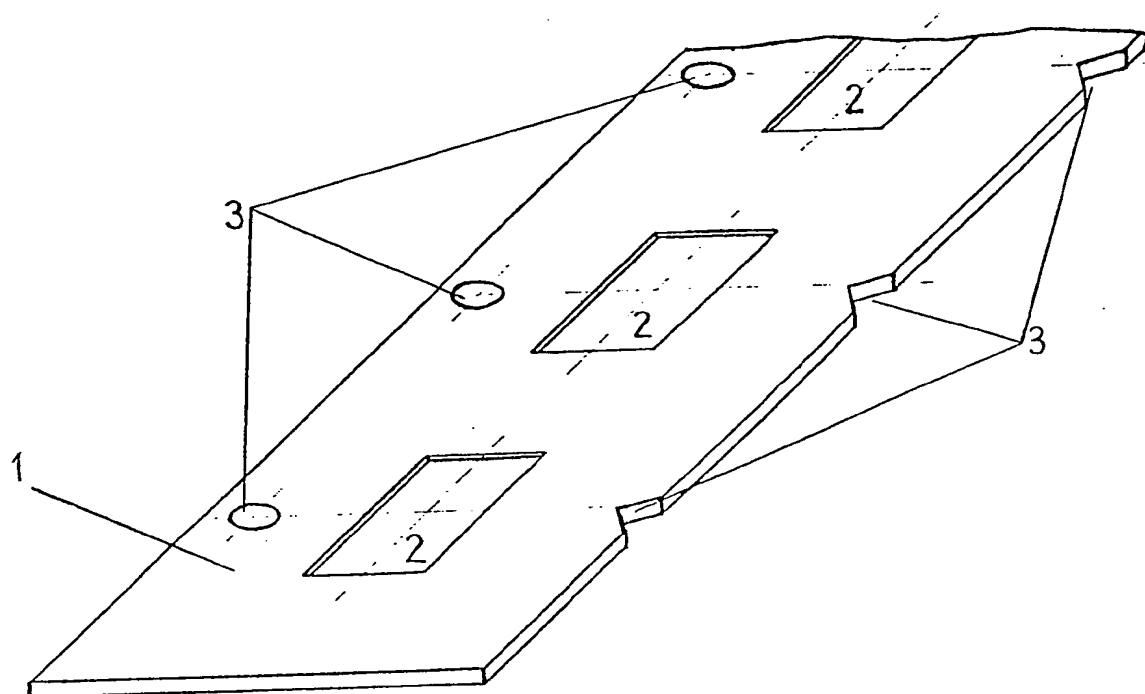


Fig. 1

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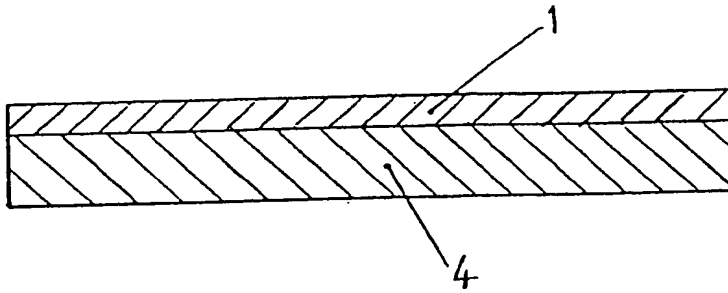


Fig. 2

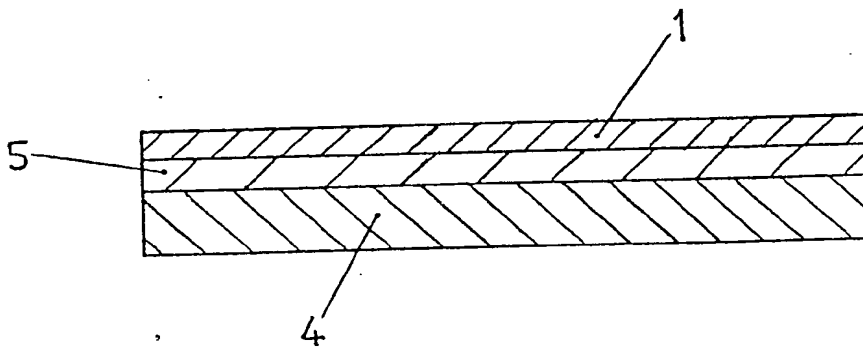


Fig. 3

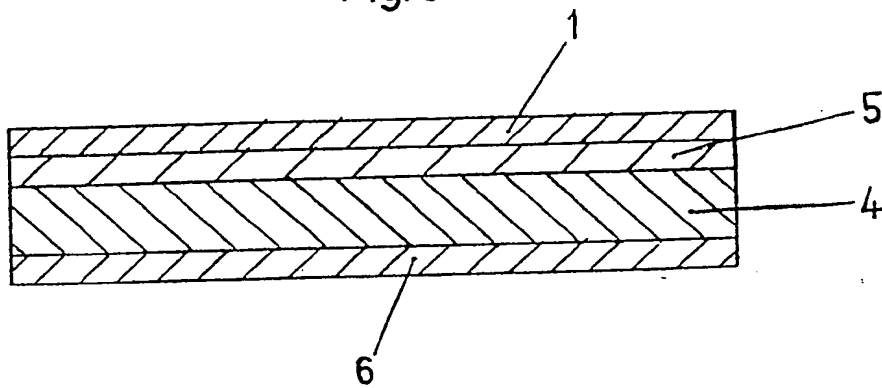


Fig. 4

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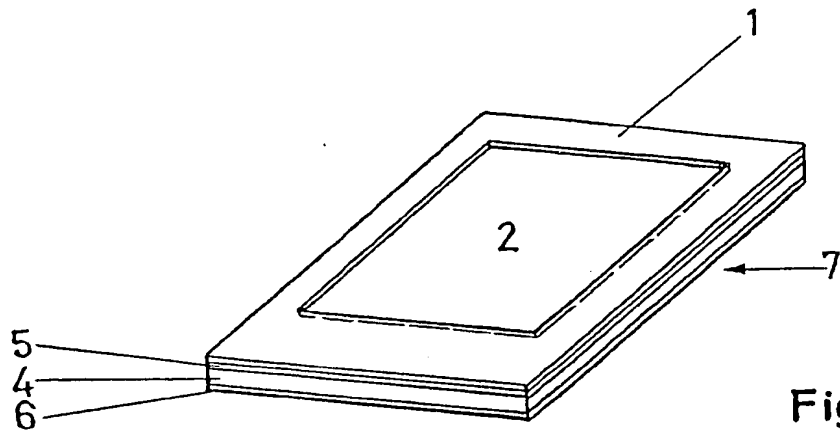


Fig. 5

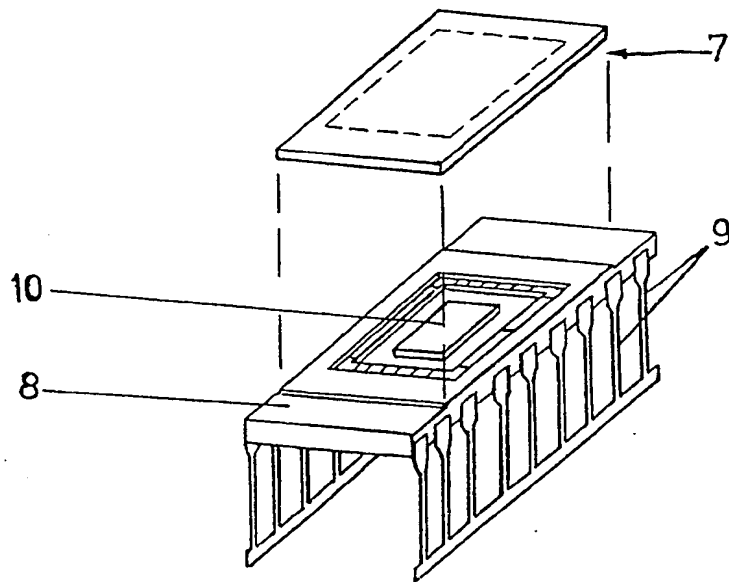


Fig. 6

## SPECIFICATION

## Improvements in or relating to semi-finished articles for the production of metal covers for housings of ceramic material

5 The present invention relates to semi-finished articles in strip form for the production of metal covers with a thickness of less than 0.5mm, for housings of ceramic material in which a semi-conductor or an integrated circuit is mounted. The  
10 semi-finished article has a metal carrier whose thermal expansion co-efficient is adapted to that of the casing material, and a solder layer secured thereto on at least one side.

A semi-finished article of the kind hereinabove referred to is usual in the trade. Metal covers are stamped from it, which are then connected with the ceramic housing by solder and seal this against the outer atmosphere. In such known semi-finished articles it may occur that, on  
20 soldering, particles of solder spray off and lead to electric disruptions in closed semi-conductors or integrated circuits. Moreover the danger also exists of evaporation of foreign material from the solder layer which leads to corrosion.

25 It is an object of the invention to provide a semi-finished article from which metal covers for sealing ceramic housings can be produced which causes substantially no disruptions on connection of the metal cover with the ceramic housing and thus also causes no disturbances in the semi-conductor or integrated circuit. Furthermore, the semi-finished article should be cheap to produce and enable mass production.

30 Accordingly, the invention consists in a semi-finished article in strip form for the production of metal covers, having a thickness of less than 0.5mm for sealing ceramic housings in which a semi-conductor or an integrated circuit is mounted, said article comprising a metal carrier whose  
40 thermal co-efficient of expansion is adapted to that of the housing material, and a layer of solder connected thereto on at least one side thereof, wherein the layer of solder has spaced recesses or cut-outs which are delimited by a border or frame of solder.

45 In order that the invention may be more clearly understood, reference will now be made to the accompanying drawings which show certain embodiments thereof by way of example and in which:—

50 Figures 1 to 4 shows views of different embodiments of semi-finished articles,

Figure 5 shows a plan view of a metal cover made from such an article, and

55 Figure 6 shows a dissociated drawing of a ceramic housing which comprises a semi-conductor or an incorporated circuit.

Referring now to the drawings, Figure 1 shows a plan view of a semi-finished article comprising a  
60 layer 1 of solder arranged on a metal carrier having spaced recesses or cut-outs 2 which are delimited by frames of solder. A notch 3 is made on both sides of the strip-like semi-finished article which facilitates the working of the article in a

65 continuous process. Each notch 3 is advantageously located on the axis of symmetry of the adjacent recess 2 extending transversely to the longitudinal axis of the strip, whereby the locational arrangement of the recess is ensured for each metal cover.

70 Figures 2,3 and 4 show further embodiments in vertical section through a strip-like semi-finished article according to Figure 1. Reference numeral 4 designates the metal carrier to which the solder layer 1 is secured. It has proved advantageous to provide an intermediate layer 5 between the metal carrier 4 and the solder layer 1 which provides the wettability of the metal carrier with the solder. A copper or copper-based alloy has proved itself as a suitable material for such an intermediate layer, and advantageously has less than 0.1% impurities therein. Nickel or nickel alloy are of advantage as materials for the metal carrier 1. Amongst the nickel alloys, nickel/iron alloys or nickel/iron/cobalt alloys are suitable; in particular the metal carrier  
85 may consist of a Ni 42/Fe 58 alloy Ni 29/Fe 54/Co 17 alloy. If the metal carrier is only provided with a solder layer on one face, then the other face is usefully provided with a corrosion protective layer 6 as is shown in Figure 4. Precious metals in particular or even a nickel layer have proved themselves as material for this corrosion protective layer 6. The solder layer may consist of tin-based alloy having less than 0.1% impurities therein such as Sn 80/Ag 20 and Sn 95/Ag 5 for example. The thickness of the articles does not exceed 0.5mm.

Figure 5 shows a metal cover 7 stamped out of a semi-finished article according to the invention.  
100 This cover 7, as seen from the exploded drawing in Figure 6, closes off the opening in a ceramic housing 8, a semi-finished article or integrated circuit 10 being mounted in the opening. The housing 8 is further provided with connecting tags 9 which are electrically conductively connected within the recess by wire connections with semi-conductors or the conductor tracks of the integrated circuit.

The manufacture of a semi-finished article may  
110 be carried out by roller plating individual layers of the article together in a continuous process. The recesses 2 are then cut by machining from the solder layer by milling or grinding.

The metal carrier layer 4 has a thermal co-efficient of expansion adapted to that of the housing material.  
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## CLAIMS

1. A semi-finished article in strip form for the production of metal covers, having a thickness of less than 0.5mm for sealing ceramic housings in which a semi-conductor or an integrated circuit is mounted, said article comprising a metal carrier whose thermal co-efficient of expansion is adapted to that of the housing material, and a layer of solder connected thereto on at least one side thereof, wherein the layer of solder has spaced recesses or cut-outs which are delimited by a border or frame of solder.  
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2. An article according to claim 1, wherein an intermediate layer is arranged between the metal carrier and the solder layer so as to increase the wettability of the metal carrier with the solder.
- 5 3. An article according to claim 1 or claim 2, wherein the metal carrier is provided on one face only with the solder layer, the other face of the metal carrier being provided with a corrosion-resistant layer.
- 10 4. An article according to claim 1, 2 or 3, wherein the metal carrier consists of nickel or a nickel alloy.
- 15 5. An article according to claim 4, wherein the metal carrier consists of a nickel/iron alloy or a nickel/iron/cobalt alloy.
6. An article according to claim 5, wherein the metal carrier consists of a nickel 42/iron 58 alloy.
- 20 7. An article according to claim 5, wherein the metal carrier consists of nickel 29/iron 54/cobalt 17 alloy.
- 25 8. An article according to claim 2, wherein the intermediate layer consists of copper or a copper alloy with less than 0.1% of impurities.
9. An article according to any of the preceding claims, wherein the solder layer consists of a tin base alloy with less than 0.1% of impurities.
- 30 10. A semi-finished article according to any of the preceding claims, which has a notch on at least one longitudinal side.
11. Semi-finished articles substantially as hereinbefore described with reference to the accompanying drawings.

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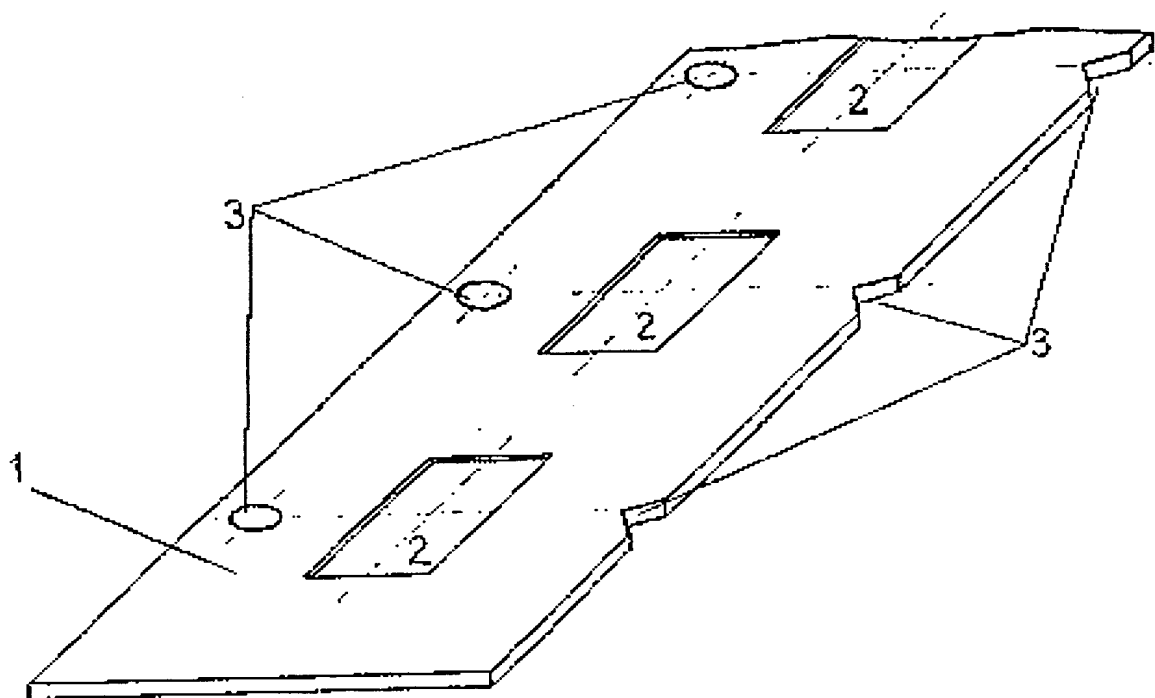


Fig. 1

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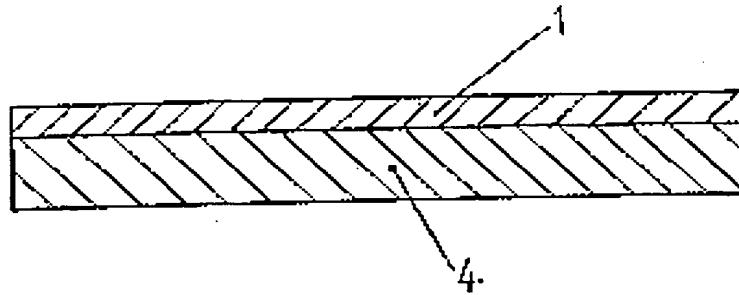


Fig. 2

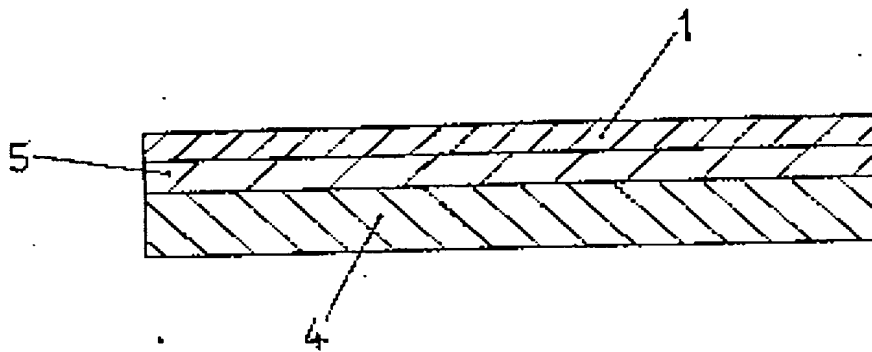


Fig. 3

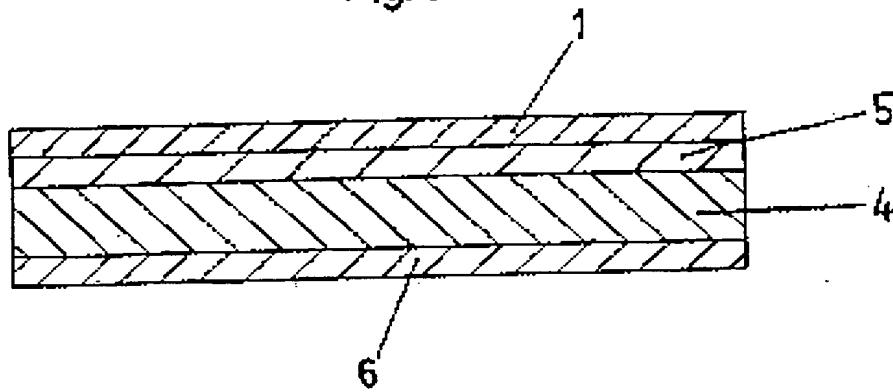


Fig. 4



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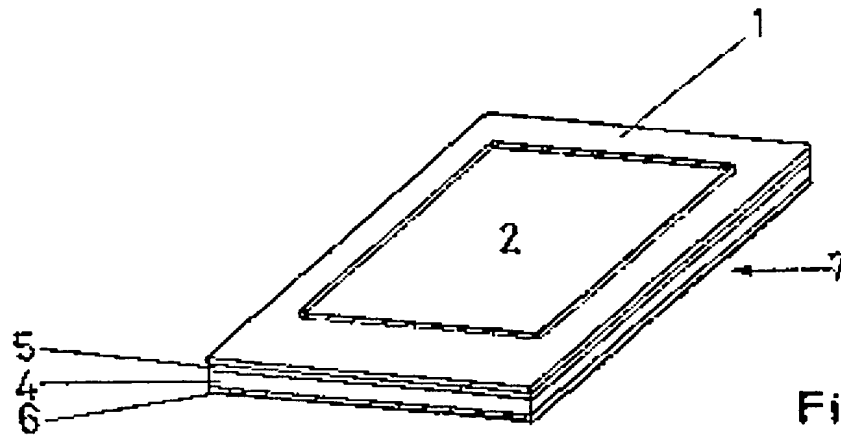


Fig. 5

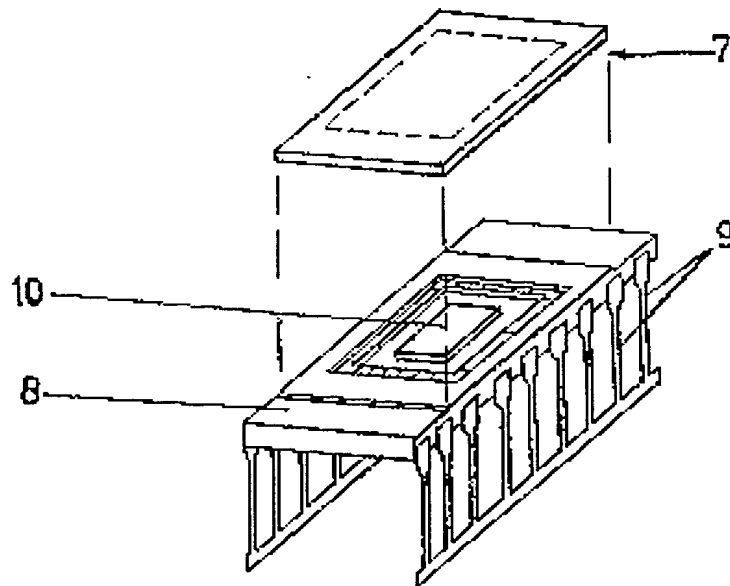


Fig. 6